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August 2005 Volume VI, Issue 8

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Maj. Gen. Perry Lamy, AFRL commander, at left, and Brig. Gen. Mark Matthews, AFIT Commandant, display the newly signed Memorandum of Agreement between the Air Force Institute of Technology and the Air Force Research Laboratory. The agreement creates a strategic research alliance between both organizations. (Air Force photo by William Hancock)

AFIT, AFRL agreement boosts research capabilities

by Larine Barr, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Maj. Gen. Perry Lamy, AFRL Commander, and Brig. Gen. Mark Matthews, AFIT Commandant, signed the agreement in a ceremony at AFIT Building 644.

"This solidifies the long-standing relationship and common goals that both organizations share, and allows us to more fully leverage our resources," said General Lamy, after signing the agreement. "Both organizations have a critical role in creating the Air Force of the future and together we can solve future challenges."

The agreement was in the works for nearly one year and forms a strategic alliance between both organizations, which have been in partnership for more than 50 years. It supersedes all other existing agreements between the AFRL's 10 technology directorates and AFIT, and consolidates 10 separate agreements into one corporate MOA.

"Today is significant and fortuitous — this MOA gives us greater ability to rapidly respond to the needs of the Department of Defense and the warfighter in the field," General Matthews said during the ceremony.

According to Jack Blackhurst from the AFRL plans and programs directorate at Wright-Patterson Air Force Base, the MOA was established for two reasons: education and research opportunities.

"We look to AFIT to educate our future scientists and Air Force leaders and to leverage AFIT research talent and lab facilities," Mr. Blackhurst said.

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August 2005

Commander
Maj. Gen. Perry L. Lamy

Director of Public Affairs
Deborah Csutoras

Production Editor
Jill Bohn

news@afrl is published monthly by the Office of Public Affairs of Air Force Research Laboratory Headquarters. Contact the office at AFRL/PA, Building 15 Room 225, 1864 4th St., WPAFB, Ohio, 45433-7132, (937) 656-9872, or send e-mail to AFRL/PA@afrl.af.mil. Contents of this newsletter are not necessarily the official views of, or are endorsed by, the U.S. Government, the Department of Defense or the Department of the Air Force. The editorial content is edited, prepared and provided by this office. Photographs are official U.S. Air Force photos unless otherwise indicated. Submission guidelines are available from this office or on-line. Electronic copies and additional full-text articles are available online at: http://www.afrl.af.mil/news.

AFRL delivers body armor to deployed troops

by Sue Murphy, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio —- An Air Force Research Laboratory materials research processing engineer presented several sets of high tech body armor to Maj. Michael Florio, commander of the 88th Security Forces Squadron, whose unit deployed in mid-July.

1st Lt. Todd Turner from AFRL's Materials and Manufacturing Directorate collaborated with Excera Materials Group Inc., of Columbus, to develop a metal-ceramic hybrid material for use in the armor. The new composite material creates a higher-performance, lower cost, lighter-weight small arms protection for warfighters.

The body armor is being tested by Army, Marine and Air Force units. Improvements and modifications are continually being made based upon their comments. Funding is provided through the Technology Transition Initiative Program from the Office of the Secretary of Defense, the Air Force Protection Battlelab, Lackland AFB, Texas, as well as internal funding from AFRL.

"The idea is to deliver the best product to the men and women who are taking bullets – they're the ones who truly matter," said Lieutenant Turner. "Knowing that it could save the life of a fellow Airman makes me feel especially proud."

Major Florio said that it's important to develop and field the best equipment to not only protect the troops, but also to give them an advantage against their enemies.

"The product AFRL has produced is light-weight, dependable and has the capability of taking hits," Major Florio said. "These characteristics give our forces the ability to move and shoot, as well as peace of mind that they are protected." **@**

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http://www.afrl.af.mil/news/index.htm

Air Force experiments to return home on Discovery

by Larine Barr, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — After existing nearly four years on the International Space Station, more than 800 Air Force experiments returned home with the space shuttle Discovery, which launched from Cape Canaveral, Fla., Aug. 1.

The Materials on the International Space Station Experiment, or MISSE, was installed by the Discovery crew in August 2001 for what was to be a one-year science experiment to learn how different materials react when exposed to the rigors of space, according to Michael Stropki, a scientist with the Air Force Research Laboratory's Materials and Manufacturing Directorate at Wright-Patterson Air Force Base, where the experiments originated.

When the space shuttle Columbia exploded upon re-entry Feb. 1, 2003, the experiments would wait for the historic return-to-flight to be retrieved by the Discovery launch.

A space shuttle Discovery astronaut installs a special carrier on the International Space Station that houses Air Force Research Laboratory experiments. AFRL is studying a variety of materials and how they react to the space environment. (NASA photo)

"While the experiments were originally planned to spend only one year in space, having existed four years there may have eroded away the entire material in a few of the specimens," explained Mr. Stropki, who was the initial program manager on the project in 2001.

"In those cases it will not be possible to know just how soon it took to reach failure," he said. "While at the same time, for other more successful candidates, the additional time in space will likely show that those materials have a greater durability and are able to survive the space environment for the longer periods needed for these materials."

The goal of the MISSE program – a $3 million cooperative effort between AFRL, the Department of Defense Space Test Program, Boeing Phantom Works, and NASA's Langley Research Center, Marshall Space Flight Center and Johnson Space Center – is to discover how materials are affected by exposure in an effort to develop more durable, reliable and affordable materials and technologies for future space vehicles.

"This information is crucial to providing the needed space materials for the 21st century," said Pat Valentino, AFRL's current program manager. "New, affordable materials are the enablers for advanced reusable launch systems and advanced spacecraft systems, including optics, sensors, electronics, power, coatings, structural materials and protection."

While at home on the orbiting space laboratory, the experiments have been housed in four passive experiment carriers, similar to suitcases, which NASA astronauts installed in strategic locations on the outside of the International Space Station. Some of the specimens include optical materials and coatings, light-weight radiation shielding materials, thermal control coatings (flight paint), Kevlar and carbon

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While both organizations have performed coordinated research programs for many years, the MOA clears the path for streamlined access and resource sharing between the lab's sites across the United States and AFIT.

"We want to break down any barriers for AFIT interaction at all of our sites," Mr. Blackhurst said. "This past year, AFIT established a full time professor at Kirtland Air Force Base and they have created agreements with the University of New Mexico. We hope to explore educational opportunities like this at our other sites."

Key elements of the MOA are: to jointly develop personnel expertise and competencies in research areas of mutual interest; define the support required for major collaborative research programs and shared facilities; regularly review and highlight partnership accomplishments; and identify opportunities for multi-partner teaming with other organizations to accomplish research objectives.

One of the primary benefits of the MOA will be increased flexibility between AFRL researchers and AFIT faculty and students, Mr. Blackhurst said. "Researchers will be able to choose topics based on annual research calls, which are centered on topics of Air Force interest – specifically air, space and information technologies," he said.

Another part of the agreement calls for increased interaction between the leadership of both organizations by holding an annual partnership summit, a yearly AFRL/AFIT interchange meeting, and an annual technology days event. The MOA also establishes a partnership working group, composed of the AFRL chief technologist, AFRL chief scientists, and AFIT graduate school deans and department heads. **@**

'All roads lead to Rome' for two former colleagues

by Francis L. Crumb, AFRL Information Directorate

ROME, N.Y. — Shambhu Upadhyaya and Kaliappa Ravindran became acquainted while attending the Indian Institute of Science in Bangalore, India during the mid-1970s. After earning bachelor's and master's degrees, they continued their friendship by becoming colleagues at the Indian Space Research Organization, again at Bangalore.

Dr. Shambhu Upadhyaya

Dr. Kaliappa Ravindran

A pursuit of doctorate degrees finally sent the pair of scholars on separate - and far flung - paths: Kaliappa to the University of British Columbia, Canada, and Shambhu to the University of Newcastle, Australia.

After earning their doctorate degrees, the two became less dispersed. Dr. Upadhyaya eventually joined the faculty at the University of Buffalo and Dr. Ravindran became a faculty member of City College of the City University of New York. Although they occasionally learned of each other's research activity through professional publications, from the time they left India they remained out of touch for nearly 20 years.

Their reunion resulted after Dr. Kevin Kwiat, a senior computer engineer at the Air Force Research Laboratory (AFRL) Rome Research Site, presented papers at two different symposia – meeting Dr. Upadhyaya at one symposium and Dr. Ravindran at the other. After discovering that he shared research interests with both professors, Dr. Kwiat invited them to apply to the National Research Council (NRC) Summer Faculty Fellowship Program.

The NRC accepted both Indian scholars - who are now U.S. citizens — into the program, with Dr. Kwiat as their mentor. They became the first two NRC Summer Faculty Fellows to join the AFRL Information Directorate's staff, reuniting in the summer of 2001 after not having seen or heard from each other in almost two decades.

During their multi-summer NRC fellowships, they explored ways to transform concepts from the fault-tolerant computing domain to address critical needs within the information assurance community.

"Drs. Upadhyaya and Ravindran left a substantial research track record of their four summers here at the laboratory, as exhibited by numerous publications," said Dr. Kwiat, of the directorate's Information Grid Division. "As further evidence of their productivity, their past work with AFRL continues to influence students today who, in turn, are contributing to our information technology mission."

For two scholars whose friendship had its early beginnings in India, the NRC Summer Faculty Fellowship Program provided an unusual professional intersection at the Air Force Research Laboratory ... lending credence to the old adage that "all roads lead to Rome." @

AFRL hosts dinner for annual corporate award winners

by Jill Bohn, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory honored outstanding individual and team accomplishments at the 6th Annual AFRL Corporate Awards Luncheon July 14 in Albuquerque, N.M.

Award winners were selected from each of AFRL's directorates. Commander's Cup winners were selected by Maj. Gen. Perry L. Lamy, AFRL Commander, while winners in the remaining categories were chosen by the AFRL corporate award selection board and approved by General Lamy.

The Commander's Cup (Team) Award was presented to the Next Generation Launch Vehicle Space Vector Team, with members from the Propulsion Directorate, Edwards Air Force Base, Calif.; and the Air Vehicles Directorate, the AFRL Headquarter's Plans and Programs Office, and the Materials and Manufacturing Directorate, all from Wright-Patterson Air Force Base, Ohio. The team constructed a top level roadmap leading to revolutionary space lift capability which would be technically achievable for assured access to space by 2020.

Team members are: Michael T. Huggins, Parker L. Buckley, Lt. Col. James M. Ceney, Jay K. McDaniel, Jean-Luc Cambier, Carl E. Ousley, Eric J. Becker, Raymond H. Moszee, Glenn W. Liston, Greg B. Bruening, Jeff V. Zweber, John F. Remen and Drew O. Degeorge.

The Commander's Cup (Individual) Award went to Richard R. Stotts, Human Effectiveness Directorate, Wright-Patterson Air Force Base. Mr. Stotts was honored for executing a $22 million budget and initiating two future biotechnology research programs totaling $7.8 million. He also discovered, developed and delivered a wide range of revolutionary technologies enhancing combat effectiveness.

John E. Leugers, Munitions Directorate, Eglin Air Force Base, Fla., received the Scientific/Technical Management (Individual) Award, in part for directing and managing the Chief of Staff-endorsed F-111/Miniature Munition International Flight Test Program.

The Scientific/Technical Achievement (Individual) Award was presented to Dr. James L. Blackshire, Materials and Manufacturing Directorate, for discovering a near-field ultrasonic scattering phenomenon found when cracked materials are probed with a laser.

The Mid-IR Team, Directed Energy Directorate, was presented with the Scientific/Technical Achievement (Team) Award, for leading the $24 million development of state-of-the-art mid-infrared semiconductor lasers. The team also incorporated lasers into countermeasure systems, including Advanced Tactical Directed Energy Systems.

The Senior Leadership (Individual) Award went to Lt. Col. Joseph C. Keelon, Human Effectiveness Directorate, for supervising a staff of 35, and expertly directing daily operations of a five-year $60 million budget for a highly classified/unclassified exploratory to advanced research program.

Douglas M. Harris, Detachment 1 – Contracting, Wright-Patterson Air Force Base, received the Leadership (Individual) Award for

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AFRL teams up to develop fly-by-light technology

by Melissa Withrow, AFRL Air Vehicles Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory teamed with Northrop Grumman, BAE Systems and Dynamic Controls Inc. to validate a fly-by-light photonic controlled actuation system (PCAS).

This PCAS consisted of a modified electro-mechanical actuator (EMA) and an optical controller that provided actuator commands to the optical EMA similar to those provided by a flight control computer. Engineers modified the EMA's motor power devices to receive and react to command signals sent via light from the optical controller. In addition, they replaced the EMA's conventional sensors with optical sensors that measured actuator position, motor position, and current and reported this information to the optical controller via fiber optic cables.

Engineers collected EMA performance data during a series of test runs. Tests verified that the modified PCAS performed as designed with no adverse effects to performance due to the fly-by-light components or technology.

The EMA consists of two small electric motors, a gear train transmission, and an actuator ram (ball screw) that moves to operate an air vehicle flight control surface, such as an aileron. Conventional EMAs are just one part of an air vehicle's fly-by-wire flight control system, which supplements the pilot's control over the aircraft's control surfaces. Fly-by-wire uses a closed-loop feedback system capable of reacting many times faster than the pilot to correct air vehicle instabilities. It enables engineers to push the envelope and develop airframes capable of meeting extreme mission needs such as low observability, high maneuverability and long endurance, while maintaining safe aircraft operations.

An issue with fly-by-wire systems is their vulnerability to electromagnetic interference (EMI), which is present everywhere in the atmosphere, including radar, radio signals and lightning. These signals can couple onto the wires and circuits of unshielded electronic devices and cause erroneous signals that can disrupt the system. Currently, fly-by-wire systems are protected against EMI by shielding, which is effective but adds weight, volume, expense, and timely maintenance requirements. Fly-by-light technology, such as that demonstrated by AFRL, does not use wires and is naturally resistant to EMI. Therefore, it can provide the same flight control capabilities without the necessity for shielding. @

Directed Energy Directorate names new deputy director

by Eva D. Hendren, AFRL Directed Energy Directorate

KIRTLAND AIR FORCE BASE, N.M. — Col. Michael W. Lamb Sr. will become deputy director of the Air Force Research Laboratory's Directed Energy Directorate this month. He replaces Col. Thomas A. Buter, who departed June 20 for assignment at Eglin Air Force Base, Fla.

Colonel Lamb has been serving as the commander of AFRL's Edwards Research Site at Edwards Air Force Base, Calif., as well as associate director of AFRL's Propulsion Directorate. Prior to that, he served as the squadron commander of the 66th Mission Support Squadron at Hanscom Air Force Base, Mass.

His previous assignments include positions in missile testing and engineering at Vandenburg Air Force Base, Calif., and F.E. Warren Air Force Base, Wyo.; special target operations at K.I. Sawyer Air Force Base, Mich.; handling intelligence and technology responsibilities with the Defense Intelligence Agency in Washington D.C.; serving as a division chief and as executive officer with the Air Force Doctrine Center at Maxwell Air Force Base, Ala.; and detachment and site commander at Edwards Air Force Base, Calif.

Colonel Lamb, a native of Oakland, Calif., began his Air Force career in 1971 as an electronic computer systems technician. He earned his bachelor's degree in electrical engineering and commissioned at the University of Arizona after being selected for the Airman's Education and Commissioning Program in 1983. He received his master's degree in astronautical engineering in 1995 at West Coast University in Los Angeles and earned an additional master's in strategic studies with honors from the Air War College at Maxwell Air Force Base, Ala. in 2002.

Colonel Lamb holds a doctorate degree in management in 1994 from California Coast University in Santa Ana - and a second in management information systems from Columbus University based in Picayune, Miss., where he completed his dissertation researching information warfare in 2004.

His military education also includes graduation with honors from Squadron Officer School and Air Command and Staff College at Maxwell Air Force Base, Ala.; Armed Forces Staff College in Norfolk, Va.; Air War College by correspondence; and Naval War College in Newport, R.I.

His publications include: "The Report to Congress on OPERATION ALLIDED FORCE," "The People's Liberation Army: Some Comparisons, Some Contrasts," "Operation Allied Force: Golden Nuggets for Future Campaigns," "BYTES: Weapons of Mass Disruption," and "BYTES: Nanosecond Warfare—Preparing for the Fight."

Colonel Lamb was awarded the Defense Meritorious Service Medal and three Air Force Meritorious Service Medals. He also received the Kaizen Award for his efforts as a quality advisor in the 20th Air Force.

His work has been recognized nationally and internationally, with a National Courage Award presented to him by President Ronald Reagan, the Ten Outstanding Young Persons award given by President George Bush, and the Defense Intelligence Agency Director's Award, among others. @

Net Index

Due to the number of submissions we receive, some sections of *news@**afrl*** are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research Laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b L@urels

- **AFRL recognizes top scientists and engineers**
- **AFRL officer wins AIAA paper competition**
- **Engineer receives honors for recruiting efforts**
- **Information Directorate announces quarterly awards**
- **Wright-Site commander named top manager**
- **AFRL physicist named trailblazer in science**

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To submit L@b L@urels or Roundups from your directorate, send a query to AFRL Public Affairs at:

Jill.Bohn@wpafb.af.mil

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foams, multi-layer insulation materials, solar cell technology, and specialty materials such as shape memory foil and x-ray resistant coatings.

At the direction of AFRL scientists, NASA integrators placed most of the specimens in aluminum trays that hold roughly 46 samples. Other specimens were installed directly onto the trays, while a few specimens were bolted underneath the base plates to ensure they were exposed only to solar radiation.

In addition to Air Force experiments, the MISSE payload carries 11 hand-picked experiments from six Dayton, Ohio-area students in grades 1-10. "Their assignment was to identify a problem associated with long duration flight, propose a solution, and design a passive experiment to find a solution," Mr. Stropki said. Included are experiments to learn how contamination migrates in a micro-gravity environment, how materials degrade, radiation shielding tests, and the effect of space on viral protein and nonpathogenic bacteria.

According to Ms. Valentino, all the specimens have faced such grueling perils as ultraviolet ray bombardment by highly corrosive atomic oxygen and exposure to intense solar radiation during maximum solar activity.

Astronauts will uninstall the MISSE containers from the exterior of the space station and return to Earth about three weeks after launch. From there, the materials will travel to NASA Langley Research Center in Virginia, where scientists will de-integrate and disassemble the containers, then ship them back to AFRL scientists to be analyzed and later reported at a MISSE symposium in 2006.

"We are incredibly exited that MISSE is finally returning home," Ms. Valentino said. "We look forward to analyzing the flight samples and continuing this program for future experiments." **@**

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directing the awarding and administration of 400 contract actions worth $500 million.

The Supervisory (Individual) Award was presented to Maj. Heather L. Pringle, Human Effectiveness Directorate, for leading a team of 50 scientists, engineers and contractors in AFRL's training research branch.

The Mission Support (Individual) Award was accepted by Robert D. Gregory, Propulsion Directorate, for providing innovative and responsive solutions for the operation, maintenance and evolutionary development of the AFRL/PR Electric Propulsion Lab.

The Mission Support (Team) Award was presented to the Technician Work Center Team, Space Vehicles Directorate, Kirtland Air Force Base, N.M., for supporting $65 million in research and development programs covering six laboratory branches that design sensor and satellite equipment.

Lynne K. Sams, Munitions Directorate, garnered the Senior Administrative Excellence (Individual) Award for guiding administrative activities of four branches of more than 130 people, and quickly orientating branch secretaries to new administrative processes.

Mary Hosselkus, Munitions Directorate, was honored with the Administrative Excellence (Individual) Award for tackling branch requirements while keeping the division office running, and supporting all administrative division activities for the chief, deputy and technical director. **@**